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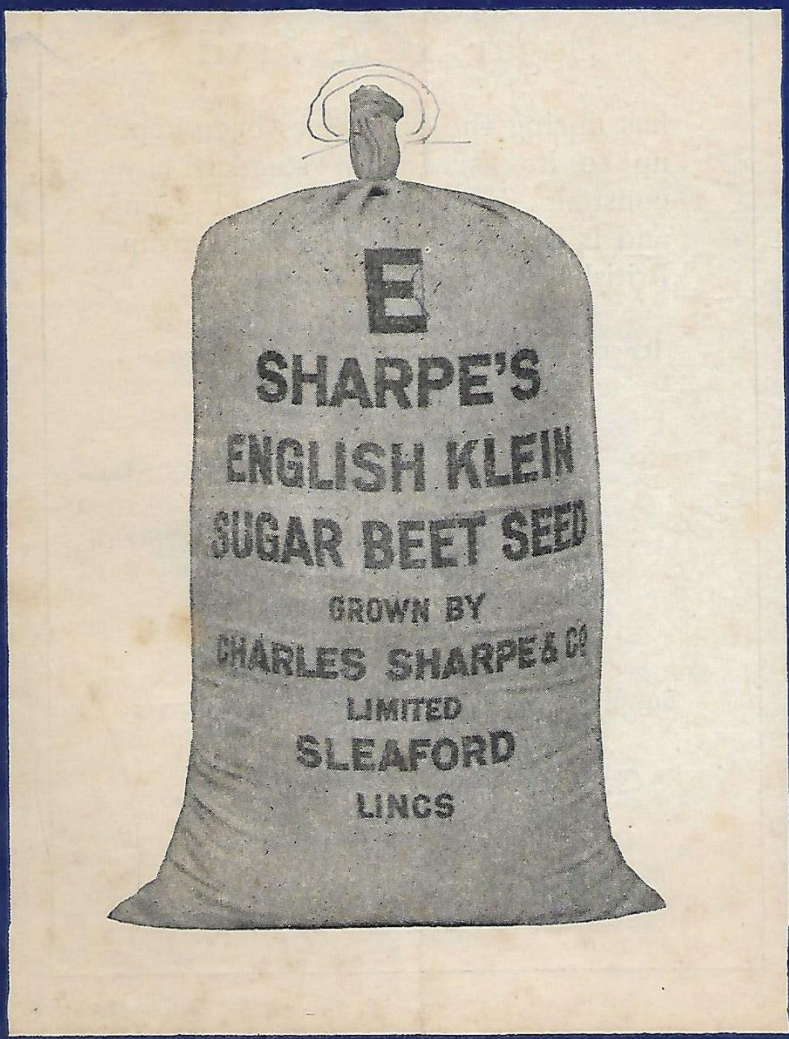
Vol. 15 MARCH, 1947 No. 3



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BRITISH SUGAR BEET REVIEW

VOL. 15—No. 3

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British Sugar Beet Review

VOL. 15 MARCH, 1947 No. 3

EARLY REFLECTIONS

WELL, somehow or other we have got over it—the heaviest crop of beet yet produced in this country! Final details relating to the season's working are not available at the time of going to press, but there is little doubt the figures, when available will confirm our preliminary information.

Handling a crop totalling four-and-a-half million tons has not been easy either from the farmer's or the factory's point of view. Experiences will have varied from district to district and farm to farm, and among the problems faced and overcome have been those arising from the late start occasioned by the disastrous corn harvest, the possibility of a shortage of labour, transport difficulties, the weather, and of course the enormous tonnage itself.

Further complications were added by the decision, as a measure of aid to growers, to even up the estimated closing dates of the factories, which demanded a carefully planned programme of rail diversions. The constant, though no doubt necessary, embargoes on loading by rail did not simplify matters. Throughput at the factories was stepped up as much as capacity and other conditions permitted, and the average daily rate of slice was far above that of the previous season. But with an extra 750,000 tons to handle an extended campaign was inevitable.

However, these are things now behind us. Let us glance at some of the more outstanding features of the year's experience, for in them we may find some useful pointers.

Contrary to the fears of many, the lack of sun had little ill-effect on the crop and the excessive rain is held to have been largely responsible for the freedom from pests. Virus yellows did not materialize on any extensive scale, due to the relative absence of aphis, and while the rain played havoc with the corn, sugar beet steadily put on weight.

Harvest was hampered first by rain and then by frost. Indeed, no year more than the one under review has more amply proved the wisdom of the oft-given advice to lift and cart to the roadside by the end of November, and to protect

the harvested roots from frost. It may be argued that in some cases shortage of labour made it difficult to act on this advice. On the other hand, it is now clear that mechanization of the harvest will before long make things very much simpler. The farmer will be less at the mercy of factors at present beyond his control.

It is gratifying to know, therefore, that a considerable number of machines were employed last season, and altogether about 100 crops of 20 acres or more were harvested with their aid.

The advantages of mechanical harvesting are such—and they will be even greater in the future—that we feel the facility should be made available to as many farmers as practicable. Growers of the smaller acreages may not be disposed as yet to invest in machines themselves, even were the manufacturers able to supply. Nevertheless, there seems a remarkable opportunity here for existing agricultural contractors to enter the sugar beet harvesting business just as they already contract to perform other work. All the evidence points to the existence of a considerable demand among farmers for beet harvesting to be done on this basis.

Discussed between implement makers and contractors this is a matter that could lead to some interesting developments. Obviously, only in this way could the maximum work be obtained from the machines available. The programme of work could be so devised as to minimise non-productive time : and as the harvesters would remain in the hands of the same operators throughout it would be reasonable to assume that breakdowns would be fewer, idle time less, and maintenance simplified. From the contractors' point of view the capital and operating costs would be spread over a number of crops and would thus, in effect, be reduced.

Mechanization is never more successful than when all its implications have been taken into consideration from the start. Thus growers who are planning to lift their 1947 crops mechanically should take that factor into account now, before they drill.

International Meeting in Brussels

EXPERTS from many countries, including Great Britain, attended a meeting of the International Institute for Research on the Sugar Beet in Brussels last month. The British party included Mr. H. Beacon, Dr. A. Carruthers and Mr. O. S. Rose (British Sugar Corporation), Mr. F. Rayns (Norfolk Agricultural Station), Dr. D. Price Jones and Dr. G. D. H. Bell (School of Agriculture, Cambridge), Dr. R. Hull (Midland Agricultural College), Dr. M. Watson (Rothamsted Experimental Station), Dr. S. Ellerton (British Pedigree Sugar Beet Seed, Ltd.), Mr. K. Lindquist (Hilleshog, Spixworth), Mr. R. A. Johnson and Mr. W. W. Johnson (Johnson & Son, Ltd.), Mr. C. A. Debenham (Marsters, Ltd.), and Mr. R. A. Peachy (Edward Webb & Sons, Ltd.).

DEATH OF SIR LOUIS KERSHAW

IT is with deep regret that the BRITISH SUGAR BEET REVIEW has to record the death in London, at the age of 77, following a short illness, of Sir Louis Kershaw, K.C.S.I., C.I.E., a former Deputy Under-Secretary of State at the India Office. Sir Louis, who had spent much of his life in India and more recently in Burma, had been a Government Director of the British Sugar Corporation from its incorporation in 1936.

A NEW FACTORY?

PROVISION of additional beet sugar factory capacity is at present under consideration in the light of representations from the National Farmers' Union, said Mr. T. Williams, Minister of Agriculture, in reply to a question in the House of Commons on February 3. He added that it would not be possible in any event to provide additional capacity in time for the 1947 campaign, having regard to other claims on labour and materials.

Sprowston's Future

FUTURE of the Norfolk Agricultural Station has been under discussion with the Ministry of Agriculture.

The Executive Committee of the Station has suggested that Sprowston is prepared to co-operate with the National Agricultural Advisory Service and to act as the Experimental Husbandry Farm for the light lands in the drier parts of England.

Acceptance of this suggestion would no doubt increase the amount of experimental work to be done at Sprowston, and extend the influence of the Station to all light arable areas, particularly in Eastern England, points out the Station's annual report for 1945-6.

Scotland's Largest Grower.

MR. F. W. Roger, Kenley Green, Boarhills, St. Andrews, has been appointed to the Scottish Agricultural Advisory Council. The Council's work consists of advising the Secretary of State for Scotland on agricultural matters.

Mr. Roger, who has the distinction of being Cupar beet sugar factory's largest grower, is already Convenor of the Sugar Beet Committee of the National Farmers' Union and Chamber of Agriculture for Scotland.

His friends everywhere will wish him well in the responsible work which lies before him.

Harvesters in Scotland

NINE complete beet harvesters were at work in Scotland last season—seven "Catchpoles," a "John Deere," and a "McConnel-Silk."

Mr. John Gibb, a well-known potato and sugar beet grower, of Fliskmillan, North Fife, had a twelve-acre crop completely harvested during his absence on a week's holiday—a feat for which he gives his "Catchpole" the credit. The machine was able to work in one direction only, as the field was on a hillside with the rows up and down the hill. It was found that when the machine was working downhill the beet would not pass over the knockers, due to the steep angle of elevation. One side of the field was very stony, but there was no hitch or breakdown.

Another machine working on hire on level ground in Angus under good conditions averaged four acres per day over a seven-day period.

Beating About . . .

Some of Mr. T. N. Mitchell's Galloways in snowbound Fife last month.—See page 94.

WORK of the Rothamsted Experimental Station is well-known to sugar beet growers, probably more so than to farmers generally, due to the wide interest taken in the sugar beet fertiliser trials, now entering their fifteenth year. Nevertheless, this is but a small part of the work of our leading agricultural experimental station.

The diversity of the work undertaken at Harpenden is remarkable, as the recently-published *Report for the War Years* 1939-45 reveals. For instance, attempts were made to find a new method of converting waste leather into a useful fertiliser. The investigation showed that this product can be converted into an active nitrogen fertiliser by detanning. The process has not yet reached a commercial scale, however.

Among the urgent investigations which arose from the war was a thorough examination of the effects on crops of poison gases sprayed from the air. It was found that mustard gas vapour produced tumour-like growths in sugar beet similar in appearance to those caused by the bacterial disease "crown-gall."

Another inquiry related to the dermatitis-producing factor in pyrethrum. (Pyrethrum, used as an insecticide in agriculture, was employed by the Services during the war in the production of mosquito-repellent preparations ; some of these were found to produce dermatitis in susceptible people). Trials in co-operation with the Army showed that compounds containing pyrethrum which had been freed from some of the serious effects were much less irritant than normal ones.

The report is a document of the utmost value, and comprises nearly 300 pages covering the whole field of the Station's work during the seven years concerned. The inclusion of an index would have greatly facilitated quick reference to this mine of information, but no doubt there is good reason for the omission.

□ □ □

Delayed harvesting inevitably leads to trouble, expense and perhaps even loss, and last season proved no exception. I have been told of a case in Essex where, due to the condition of the land just after Christmas, trace horses were used to pull off the beet, half a load at a

time. And in another instance of which I have heard the horse got bogged in a gateway, and had to be pulled out by tractor !

□ □ □

Much is being talked about farm labour these days—so much, in fact, that I recently turned up the official figures in the National Farm Survey Report to see how the force was distributed and how the number of workers varied between one size of farm and another.

Of the smaller holdings, up to 25 acres in extent, over three quarters had no regular farm workers at all, and a further sixth had only one. In the next largest group of holdings (from 25-100 acres) well over one-third had no regular workers, and the number which had more than ten was only one in a thousand.

Larger farms show a very different result. Of those exceeding 700 acres almost half (49.6 per cent.) had 20 or more regular workers, and another third had between 10 and 19.

Averaged over all farms, 43.7 per cent. had no regular workers at all and only one in about 40 had 10 or more.

by THE EDITOR

At the date on which the figures were compiled (4 June, 1941) the total number of regular land workers other than occupiers, their wives and other regular family workers, was 490,000.

□ □ □

A fieldman, compelled by the housing shortage to live in the Lincolnshire Wolds, has been telling me what it was like there during the recent protracted spell of bad weather. Apparently an American-type snow plough (one of those which blows the snow over the hedges) was brought into use ; but it was like several binders he knew, "in good working order when parked for 11½ months but a casualty during the odd fortnight". After clearing drifts only to see them fill up again by morning, he discovered it was better to make a tunnel.

Efficiency had a sardonic flavour : The Post Office managed to keep the telephone going. But it did nothing but ring with stories of still more difficulties ! And the R.A.F., who parachuted food to a neighbouring Radar station, were too good at the job—for none fell short of the target area.

When a case of pneumonia occurred in the district, the doctor, unable to traverse the roads by car, brought out his skis.

□ □ □

Made as a science film for use in schools, " Sugar from Britain," a documentary dealing with the home-grown sugar industry, with recorded commentary, has been shown privately in London by the Blackheath Film Unit, by whom it was produced.

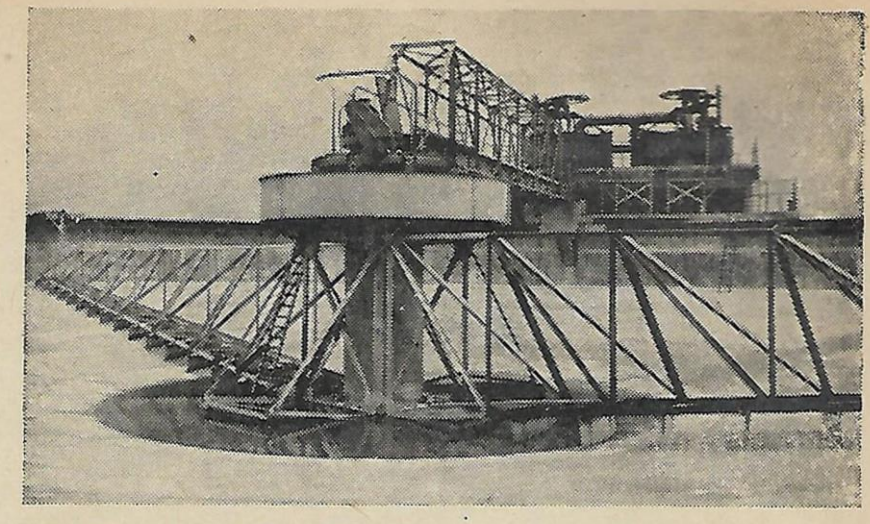
□ □ □

The article on mechanisation of beet drilling and thinning published in our last issue was attributed to Mr. C. Culpin, Norfolk Agricultural Station. It was, of course, contributed by Mr. S. Culpin, the Assistant Director of the Station. I must apologise to the author for this slip, and also to his brother, whose initial was printed in error.

□ □ □

A powered vehicle with seats for six men is being marketed in the United States to make singling a task more amenable to the workers. The vehicle has adjustable foot rests, is steered by the ridges in the field, and travels at just under a quarter of a mile an hour. The entire machine is covered by an awning for shade and carries its own water can (and perhaps a radio receiver), reports the American periodical *The Sugar Beet*.

I should have thought the men would prefer a transmitter, so that they could send for the boss's car to take them home.



Effluent Disposal at Poppleton

NEW arrangements for the disposal of factory effluent water were brought into use at the Poppleton, Yorks., beet sugar factory for the recent campaign. The plant is regarded as the most modern and efficient of its kind.

Disposal of soil at this factory has been an acute problem for some time, largely on account of the limited space available for settling ponds. After prolonged investigation by the technical staff it was decided to install a Don-Oliver Thickener and Clarifier plant at the northern end of the factory site—the only suitable space available.

The effluent is pumped through sand-washers to separate stones and gravel and is then passed into the clarifier (the large concrete tank 120 ft. in diameter shown in the accompanying illustration), where the solids are allowed to settle.

The stirring arms gradually scrape the solids towards the centre of the tank, whence they are pumped into the settling ponds together with the sand, in the form of thick sand, or slurry. After the scum has been removed the clarified water overflows the sides of the concrete tank into special channels, and is returned by pipe line to the old settling ponds and thence to the river.

When working Poppleton factory has a daily effluent of 4,500,000 gallons, and the new plant can handle the entire quantity with ease. The Rivers Board have always been satisfied with this water, but the new arrangements ensure a higher standard than ever before.

U.S. Progress in Mechanical Harvesting

ACCORDING to the Amalgamated Sugar Co., the South Central Idaho, U.S.A., district, is on the threshold of complete mechanical harvesting. For the 1946 harvest there were about 100 John Deeres, 20 Internationals and 50 Kiest machines in use.

The Kiest machine, which has not as yet been seen in this country, consists of two units and is said to be suitable for the larger acreages. It tops four rows at a time, loading into a truck.

The lifting unit deals with two rows at a time, also loading direct into trucks.

THE ADVANTAGES OF EARLIER DRILLING

A Sugar Beet Commentary
by F. RAYNS, O.B.E., M.A.
Director
Norfolk Agricultural Station

THE advocacy of early drilling has not always fallen on deaf ears ; indeed there is much evidence to the contrary and the gradual advance of the drilling season has been a noteworthy feature in the more recent developments of beet cultivation in Britain.

The time is now several days ahead of that adopted, say, in 1920-25. Thus there is often competition between cereal and beet sowing towards the end of March, for it is just as important to sow oats and barley early. Since the more general recognition of the value of early beet sowings the times of sowing barley and beet have overlapped more frequently, the late barleys competing with the very early beet sowings.

This difficulty has been reduced to some extent by the use of more tractor-drawn equipment like the combine grain and fertiliser drill which tends to push forward the drilling of the cereals, but in a late spring, such as this one promises to be, there is certain to be more intensive competition for sowings of cereals and beet at the end of March or beginning of April.

What then do we do ? Drill the last field or two of barley, or stop barley sowing and drill the first field of sugar beet ? There is plenty of evidence in support of drilling the sugar beet and leaving the barley for a day or two longer. Although we know that late sown barley rarely produces a very good malting sample, delay in beet drilling is likely to cause more financial loss than will accrue from one or two fields of barley sown in the first week in April.

There is considerable difference in yield between early and late sown sugar beet. It first interested us at Sprowston in 1934 and as we expected the results to vary from year to year we planned to repeat our experiments for several consecutive years, drilling the same variety of sugar beet on April 1st and May 1st respectively.

The results of these trials have been given before in the BRITISH SUGAR BEET REVIEW and there is no need to repeat them in detail. With the exception of one year the early April sown beet gave us two tons per acre more beet and a slightly higher sugar percentage than we obtained by drilling four weeks later. As the reduction in yield is likely to be more or less proportional to the delay in drilling the weekly loss is ten hundredweights per acre, or, to make the illustration quite simple, when beet are worth £5 per ton the loss is 50/- for every week's delay on every acre sown after April 1st.

April 1st is a somewhat arbitrary date, but there is a corresponding date or range of dates on every farm which growers of beet should try to recognise, and having done so confine their drilling as closely as possible to that time.

It is perhaps significant that we now receive an increasing number of enquiries at Sprowston about the possibilities of drilling even earlier than April 1st. We have drilled beet in March, but subsequent yield has never been more than that obtained by early April drilling ; it has usually been about the same. Thus there is no particular reason to discourage late March sowings, provided that seed bed conditions can be obtained worthy of the rather exacting sugar beet seed. Sometimes a little more bolting may be induced by March sowing, but the effects

are variable and if a non-bolting variety is used are not likely to be serious.

Despite the general tendency to drill beet earlier there is still plenty of opportunity for the lessons of early sowing to be more widely applied.

The spread of virus yellows in recent years is another important reason why we should all sow as early when we can. Virus yellows is probably the greatest menace to the beet sugar industry we have so far experienced in this country and although we do not know exactly how to control it we do know that its effects are less disastrous on early sown beet ; in other words when we sow early we still have a chance of growing a fairly remunerative crop even when a virus yellows attack develops ; when we sow late we have almost thrown away every chance of gathering the fruits of our work.

Many growers are afraid to sow early because they fear that all the beet will "come to the hoe" together. Early sowings can of course be spaced out, but the indeterminable weather factor is always present to upset our plans about singling, and in some seasons no matter how skilfully the drilling intervals are spaced the beet arrive at the singling stage almost at the same time.

Long experience has shown that this is more likely to result from drilling after the second half of April than before that time, and there is a strong and growing opinion that singling difficulties can be reduced by sowing quite early : and in fact by completing the singling before the quick-growing conditions for beet arrive. Quite often there is a period of slow development and if the beet are not too small more ground can be covered by the men in a day's singling. No more need be said on that subject now : let us return to the drilling of sugar beet.

The drilling of sugar beet is not just an isolated event in the history of the cultivation of one field of beet: it influences later operations—the time of singling, the ease, the speed and the cost of singling, the work of the horse hoe and in varying degrees all the subsequent cultivations. If the seed bed is clean, fine and firm, worked to the right depth a plant is usually assured. If the seed is level the row crop tractor works more efficiently ; if the hoeing is not well done the task of singling is increased.

These and other similar effects are well known by most practical men, but they are not always practised as they should be, and in the hurly-burly and scurry of modern seed bed preparation with fast-moving tractor-drawn implements attention to the detail of seed bed preparation and drilling is often overlooked.

The way the seed is deposited has not received the attention it merits. It influences the ease of singling by determining the thickness of the plant, their size and uniformity of growth at singling. A thin seeding is easier to single : it costs less to thin. Why then do we use 14 and 18lbs. of seed on 18 in. rows when we know full well that it will produce more than twenty times the number of plants we require ? The answer is that we do not prepare perfectly uniform seed beds at every place in the field and we have no drills which will sow the very awkward beet seed with unfailing regularity along the rows.

So we are forced to try and overcome these difficulties by using much seed and we must inevitably continue to do so until our drills are improved and the seed made more easy to drill. Promising work on that subject is going on in the U.S.A. and in England, and there is hope that in the not-too-distant future we shall be able to work with smaller seed rates of specially graded seed deposited by more precise working drills. When that happens many of the terrors of singling will disappear directly as the result of our being able to do the job of drilling rather better than we can at the moment, and we shall have succeeded in perfecting one operation to enable us to try and perfect the next.

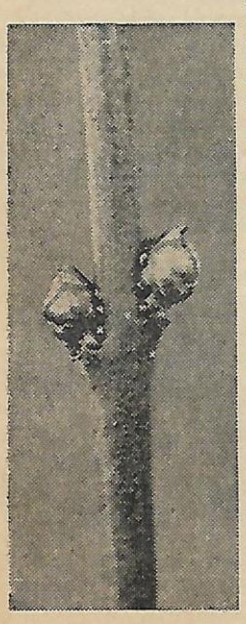
FORECASTING SUGAR BEET PESTS

by D. PRICE JONES. M.Sc., Ph.D.,
School of Agriculture, Cambridge

THE unpredictable hazards of agriculture have long been the subject of comment. Some of these hazards will disappear if present tendencies towards assured markets and fixed prices are continued, but others, weather and pests for instance, will remain.

Weather, grumbles the farmer, is the most unpredictable of all; but he still listens to the Air Ministry forecasts. Why? Partly for practical reasons—to be able to plan the next day's operations; partly for psychological reasons—just to know the worst.

Likewise with pests. The farmer feels that to be forewarned is to be forearmed and anyway, even if he can't *do* anything about it, he can at least lie awake o' nights *thinking* about it. What then, in so far as they relate to sugar beet pests are the prospects for 1947?



Twig of spindle tree with beet aphis eggs in the bud hollows.

Before answering that question, we would do well to review some of the factors affecting the incidence of the more important pests. Weather, for instance, can play an all-important part. A period of hot, dry weather in May and flea beetle may obliterate a crop of beet. Cold weather in May, sufficient to check the plants but not the wireworms or cutworms, may be equally disastrous.

A hot, dry spring and summer will favour the migration and multiplication of aphides and result in blighted crops. Cold, windy or unusually wet weather (as in 1946) may eliminate all threat of aphis infestation. A soil pest such as beet eelworm is, on the whole, less likely to be affected by weather conditions, but the symptoms of eelworm infestation are aggravated by a period of drought.

Cultural factors, such as seed bed preparation, time of drilling or singling, hoeing and manuring, can greatly affect the degree of injuriousness of pests if not their actual abundance. Crop rotation is perhaps one of the most important single factors. Close cropping with beet, mangolds and brassicas can lead to complications with eelworm, pigmy mangold beetle or mangold fly. When the "no beet after beet or mangolds" clause was introduced into the contract in 1936, it was designed primarily as a safeguard against eelworm, but its most spectacular effect was a striking reduction in the incidence of pigmy

APHIS — FORECAST FOR 1947

Dr. Price Jones, author of the accompanying contribution, makes this forecast regarding aphis for 1947: The expectation is that, granted average weather or better-than-average weather, there will be a severe infestation of aphis on sugar beet in 1947. Only a recurrence of the weather experienced in 1946 can prevent it.

mangold beetle damage.

Another factor which may influence the abundance of sugar beet pests is proximity of thick hedgerows or woods and copses capable of providing winter quarters for flea beetle or carrion beetle, or summer shelter for mangold fly. Even the shape or size of a field can affect the incidence of pests.

With all these factors varying from district to district and even from field to field, it is little wonder that forecasts for individual crops are quite out of the question. The most that can be expected from a mere scientist, as distinct from a professional prophet (a species now largely extinct) is a generalized forecast which applies to a whole region and is designed to give a picture of the average expectation.

Moreover, if a long-term forecast is required another condition must be fulfilled. The event to be forecast must be related to some phenomenon which antedates that event by some weeks or months. Furthermore, the phenomenon must be susceptible of measurement and interpretation, a process which implies the existence of a certain body of knowledge.

Generally speaking, most pests are so dependent upon conditions at the time of their appearance that long-term forecasting is necessarily uncertain. Alternatively, if they are significantly dependent on conditions during the preceding winter, autumn or summer, then the necessary background of knowledge is, in most cases, lacking.

All this may sound both confusing and pessimistic. It is inevitably confusing because of the essentially complicated nature of the problem but it need not give rise to pessimism. One sugar beet pest has been the subject of an annual forecast since 1939 and two or three others may be added in due course.

The possibility of forecasting outbreaks of the beet aphis (*Aphis fabae*) arises from the fact that these outbreaks are largely determined by the abundance of aphides at the beginning of the season, which is itself dependent upon the abundance of over-wintering eggs. The eggs are laid mainly on the spindle tree (*Euonymus europaeus*) and, by examining specimen shoots collected from a large number of bushes each winter, it is possible to obtain an estimate of the relative abundance of the eggs. Comparison with previous winters and a knowledge of the infestation following those winters provide the basis for a forecast for the ensuing season.

There is, of course, a weak link—the weather. An "average" spring and summer facilitates a normal development of the infestation. An abnormal spring and summer on the other hand may either intensify or check an infestation. Putting all these factors into a simple generalization, we might say that the odds in favour of a correct forecast are not less than about 4 to 1, and might even be as high as 10 to 1.

And the forecast for 1947? The collection and examination of shoots was completed in January. The results show that the abundance of eggs in East Anglia and neighbouring districts is roughly comparable with that of the preceding winter (1945-46) which was the highest for eight years.

The expectation is therefore that, granted average weather or better-than-average weather, there will be a severe infestation of sugar beet in 1947. Only one thing can prevent such an infestation—a recurrence of the weather experienced in 1946.

Growers are invited to choose between the black devil from the spindle tree and the deep green sea of corn sprouting in the shock.

CLERICAL ERROR?

Extract from letter received at the Kidderminster, Worcs., factory, from a grower :—"I am sure you have made a mistake in my last account. You have charged me freight and this truck was sent under Free Loading."

HURDLE SHEEP IN WEST NORFOLK

by J. KNIGHT
(Agricultural Staff, King's Lynn Beet Sugar Factory).

WAR inevitably brings a train of upheavals and drastic changes throughout industry, and agriculture certainly had its share. No war, however, has produced so many as the one just ended, and in West Norfolk none has been greater than the almost total extinction of what are known as "hurdle sheep," that is, sheep folded on arable land.

Unquestionably these flocks, coupled to and reared in conjunction with the beet sugar industry, the beet tops securing the winter feed, did more than any other factor to save light land farming in West Norfolk between the wars.

Large flocks of all varieties were a strong part of our farm economy up to 1939. To-day they are non-existent.

For example in my own particular sugar beet district and in an area of less than five square miles, over 100 score ewes have been sold off. What are the reasons for such a drastic change in our economy?

Firstly, all grass, marsh and even the valuable salt marshes along our sea coast were ploughed up under Government direction and put down to corn. Secondly, leys were cut to vanishing point. And last, but not least, the prices of wool and mutton were held down to a hopelessly uneconomic level against the stepping up of the cost of labour. To-day the old mixed farm, the stronghold of West Norfolk between the wars, no longer exists, and the valuable practice of feeding off tops of sugar beet has been discontinued.

Under to-day's conditions it is true that most of our tops are ploughed in, outside the use made of them in the bullock yards; their value has not therefore been wholly lost. But as a means of the rapid production of meats and fats they are now almost wholly discarded. In the years 1943, 1944 and 1945, our sugar beet industry faced an increasing menace in the spread of the virus yellows disease. One cannot help dwelling on the theory that when tops are sheeped off the land is left clean, as against the inevitable encouragement of virus host plants by the bad ploughing-in of tops.

The eradication of sheep from these light lands leaves them, in my opinion, in no condition to withstand a post-war slump. The key to the future surely rests on the price of wool and mutton in proper relation to labour; in short, to a return to what, with some reason, our lands were known as: Sheep, barley and sugar beet lands.

The Minister's recent speech to the Council of Agriculture, in which he pointed out that agriculturists knew what was best for agriculture in the long run and declared that a predominantly livestock farming would best meet the consumers' needs when the present emergency period had passed, will have been noted with interest by many.

Dirt Tare 3 lb.

AN eleven-acre beet grower on medium silt in the King's Lynn factory area harvested the whole of his crop last season with an average dirt tare of only 3lb. per cwt. He used a "Cook" elevator for dumping on the roadside first, which enabled him to make an 8ft. high clamp without extra exertion.

"I consider this speaks highly for the cleaning ability of the machine," Mr. P. Warner, the district fieldman, told the BRITISH SUGAR BEET REVIEW. "The cost of the machine is considerable and the grower doubted if it was an economical proposition."

CONTROL OF MANGOLD FLY ON SUGAR BEET

by

A. ROEBUCK, N.D.A.
and
J. WHITE, B.Sc.
(N.A.A.S., East Midland Province)

DURING the past seventy years or so, the Mangold Fly (*Pegomyia betae* Curtis) has been of interest because of the apparent fluctuations in its appearance. It has seemed almost absent for a number of years, then built up quickly to serious proportions only to die away suddenly.

This cycle has usually occupied about ten years—serious attacks were reported on mangolds around 1920, and on mangolds and beet in 1929-30. It increased in numbers towards another peak in the early years of the war, but it has not decreased in intensity as previously—indeed it seems to be spreading and becoming a greater menace from year to year.

During 1946, serious attacks developed over a wide area of the country, particularly in the North and Midlands. It is an interesting speculation as to whether this increased activity has been caused by the increased acreage of sugar beet. If so, is the mangold fly going to be a pest in each and every season?

The life history of the fly is straightforward: adults, emerging from the soil during the latter part of April and early May, lay their eggs on the young seedlings. These eggs, which are white and about one twenty-fifth of an inch long, are deposited on the underside of the leaves singly or in small groups.

The tiny larvae that hatch from the eggs at once burrow into the tissue of the leaves. Consequently it is not uncommon for the first intimation of attack to be the small dull yellowish-green blotches developing on the leaves. Inside each mine can be found a small legless larva feeding upon the leaf tissue, leaving intact the upper and lower surfaces. This area quickly turns brown and shrivels, presenting the well-known scorched appearance of the sugar beet plants.

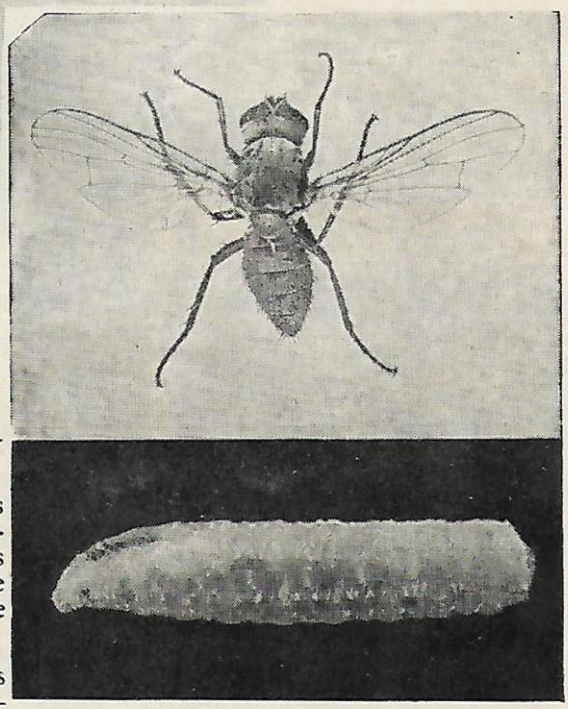
The dangerous period is undoubtedly the time when the young plant is dependent on its two cotyledons, before the true leaves develop. At this stage a heavy attack can kill up to 50 per cent. of the seedlings, whilst giving a serious set-back to the remainder: but if the true leaves are beginning to grow, losses are usually much lower. Although an attack can appear to be very severe, sugar beet plants exhibit a remarkable power of recovery, and the actual loss of crop is usually far less than might at first be expected.

The larvae feed for about three weeks, then drop from the leaf and pupate about two inches below ground level. A second generation appears during June and July, and a third in August, but these are relatively unimportant compared with the first. They seldom have any appreciable influence on the weight of crop harvested.

During 1943-4, experimental work was carried out in Central Nottinghamshire where serious losses had been experienced for several consecutive years. The habits of the fly were studied and experience was gained concerning possible means of control. As a measure of the intensity of attack usual in that area, on one field studied, the average number of eggs per yard of drill row was found to be 366, or approximately 2,500,000 per acre—and this

Left : Young plant showing blistered leaves.

Below : (top) Adult mangold fly ; (bottom) Larva of mangold fly. Both much enlarged. (Reproduced from Ministry of Agriculture Advisory Leaflet No. 91 by permission of the Controller H.M.S.O.)



infestation was not exceptionally heavy.

Furthermore the plants survived and yielded between eight and nine tons per acre, indicating the powers of recovery of the crop.

Three possible methods of control are available:—

i. Rolling to kill the larvae in the leaf ;
ii. Adjusting the date of drilling so as to avoid the attack ;
iii. Killing the adult flies as they emerge, before they lay their eggs.

Rolling on many soils is quite impracticable without doing more damage than that caused by the insect, and by the time rolling is carried out to kill the maximum number, many larvae will have pupated.

By drilling early, the crop can under suitable conditions be got past the very susceptible stage before the fly is active, but should conditions be against rapid growth, serious losses might still result. To avoid the first attack completely it is necessary to delay drilling till the second week of May, and this has an appreciable effect on the ultimate yield. In view of these limiting factors, work was carried out to

Continued on page 107.

REARING HOME-BRED STOC

Efficient use of Beet By-Products in V

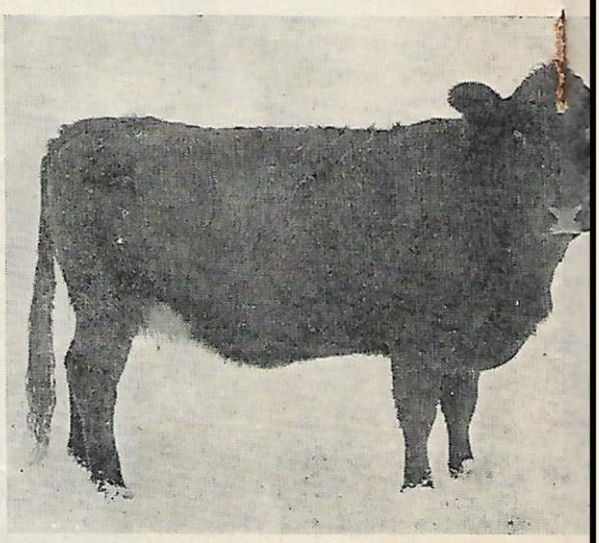
SELF-SUFFICIENCY as far as possible in the production of home-grown feeding-stuffs and home-bred stock seems as sound a policy in peace as it was in war. Mr. T. N. Mitchell, of Clentrie, Fifeshire, who is trying to achieve this object on his farm near Kirkcaldy, visited recently by the present authors, says he has found that his acreage of sugar beet, though small, can be a great help provided full use is made of the by-products.

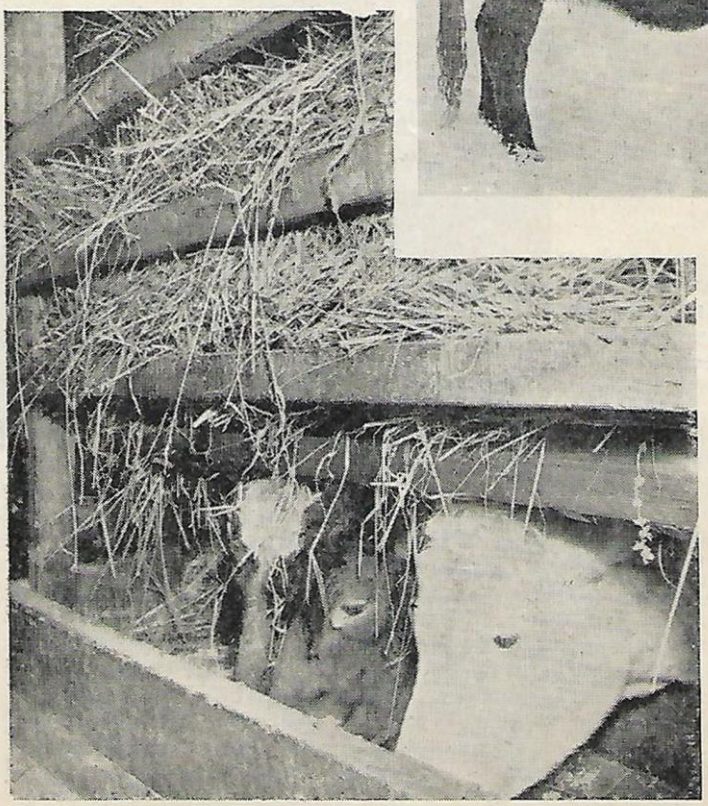
The farm is situated in a picturesque corner of south-west Fife, the house and steading being 300 feet above sea level, with much of the land at an elevation of 500 feet. It is typical of many West Fife farms, and is in an area where sugar beet is not extensively grown. The arable land in the district is considerably broken up by high ranges of hills which form rough grazing for most of the farms.

Clentrie's normal area is 365 acres, but this was increased during

Right : E
wet su

Below : On
Gallow



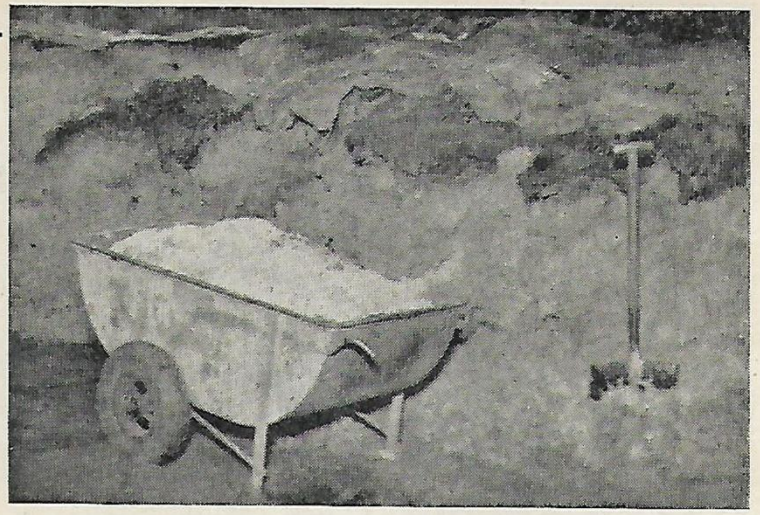


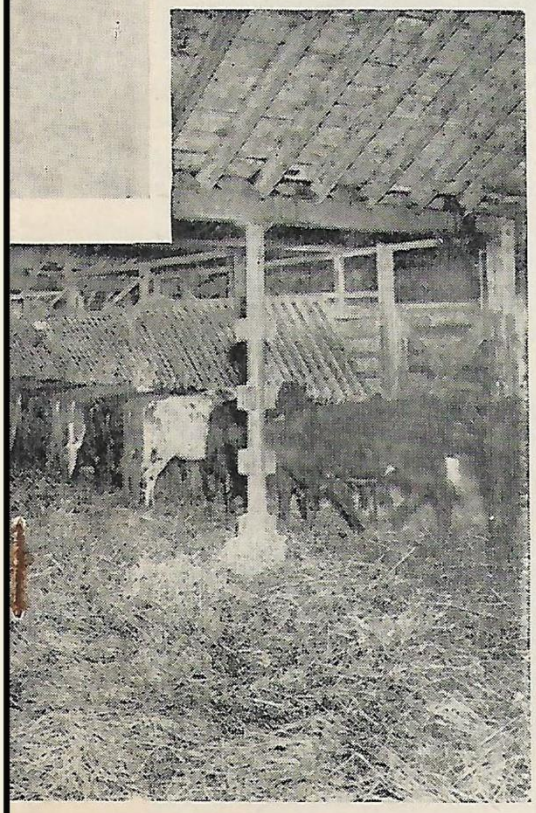
CK ON A SCOTTISH FARM

W. Fife

: Ensilage made from
: sugar beet pulp.

: One of Mr. Mitchell's
lloways.





by J. McCLOY and F. W. SUTTON

Cupar Beet Sugar Factory

the war by the addition of some ploughed up park land, bringing the total to approximately 400 acres. It is roughly divided into 200 acres (Class B) rough grass and 200 acres arable (70 acres of arable being over 300 feet above sea level). The soil varies from light to heavy loam.

Contours are sharp and steep with the best of the arable land on either side of a stream which forms the centre of an irregular valley. Some of this land is in need of drainage, and the bed of the stream has been recently lowered by dredg-

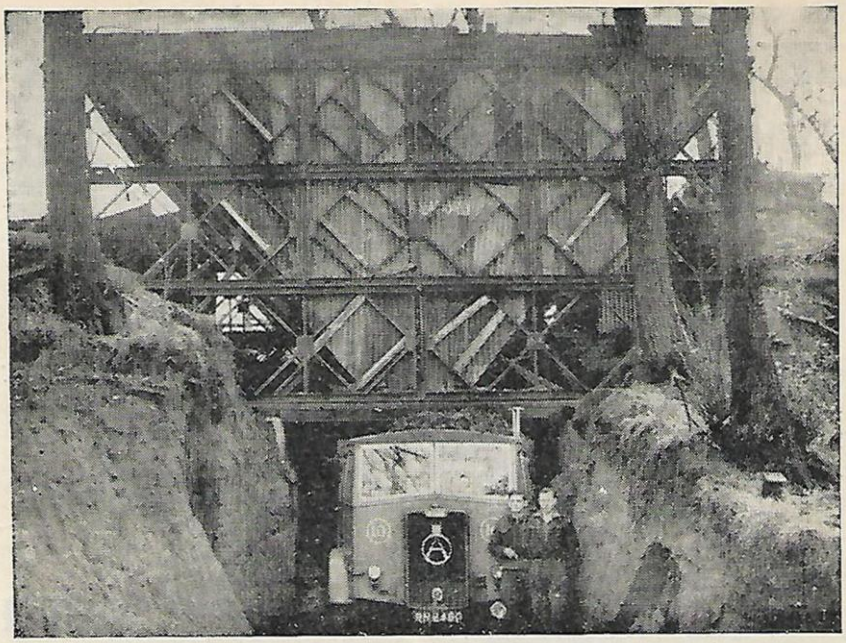
Bottom: Two views of the typical Scottish cattle courts. The cattle are fed from a central gangway with concrete troughs on either side and hay or straw racks over each.

ing to allow some tile draining to be tackled, which is now in hand. The bulk of the farm lies on a south-eastern exposure, rising up to the rough hill grazing which forms the top of a windswept ridge.

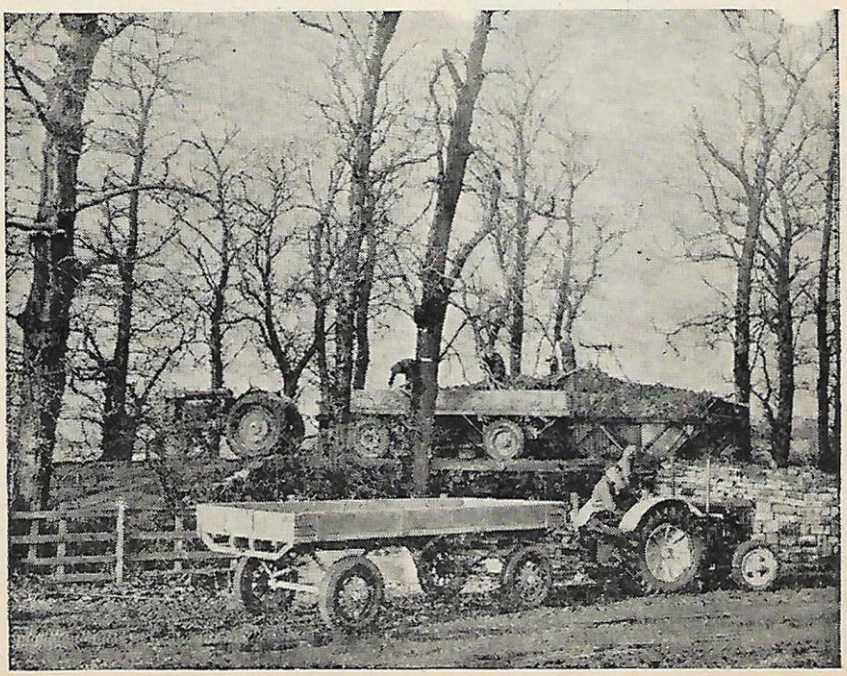
Continued on page 109

13 TONS IN NINE MINUTES

See article opposite



On a 20 mile journey this device enables a 13 ton lorry to earn up to £30 a day when loaded both ways. The hopper is formed from Bailey bridge units.



BAILEY BRIDGE UNITS AID SUGAR BEET LOADING

WAR-TIME Bailey bridge units have been put to a novel and ingenious use by Mr. E. Shaw Browne, of Cavendish Lodge, Clipstone, near Mansfield, Notts. The plant, consisting of a loading dock and an unloading hopper which fills lorries by gravity, was constructed in a "combined operation" with the Westfield Transport Co., Ltd., who have done all Mr. Browne's transport for the past fifteen years. The comparatively modest outlay was shared between the parties.

As with all his farming operations, Mr. Browne's aim is to increase output per man-hour and to apply the simple laws of mechanics to reduce heavy manual labour wherever possible. To visualise how this has been achieved in the present instance one needs to picture the gently rolling contours of a typical "forest" farm on the Bunter sandstone formation of north Nottinghamshire, with a wooded knoll having just the right elevation on one side combined with a gentle gradient on the other, so forming an ideal site for the loading dock. On the loading side an earth and stone ramp, or causeway, connects with the field road.

Four tractor-drawn trailers working in relays feed the 90-ton hopper which straddles a 10ft. deep alley cut out of the hillside to receive the lorry to be filled.

The Westfield Transport Co. purchased and erected the 15 Bailey bridge units and the necessary iron girders to carry them, and provided the second-hand corrugated iron sheets which are clamped to the bridge units to form the great V-shaped hopper. And it was their mechanics who made and fitted the roller-operated charging doors in the hopper bottom. Labour, stone, cement, sand and bricks were found by Mr. Browne.

Farm workers and lorry men alike appreciate the saving in labour it has effected.

The writer watched a six-wheeled lorry backed under the hopper. The loading doors were released in two sections, filling the back and front ends of the lorry simultaneously. In nine minutes the 13-ton capacity vehicle was ready for its 20-mile journey to Colwick factory, where the load was discharged by "Elfa" water gun in three minutes. The lorry then moved off to the warehouse for a return "pay load" of dried beet pulp.

by H. Wickenden
Colwick Factory Agriculturist

The vehicle has a driver and mate, and on this distance the haulier can earn up to £30 daily when carrying a return load. Without the quick-loading device less than half the tonnage could be handled, and then only at the expense of hand labour.

Next season the hopper capacity will be increased and a mechanical loader used to fill it from ground level, thus eliminating upward throwing when the hopper is full. Incidentally, such a loader will screen out loose soil.

Mr. Browne is not out to increase his beet acreage, which varies yearly from 200 to 150 acres. He says his aim is progressively to increase the yield per acre by mechanising every operation from seed bed preparation to delivery, and so be able to time each process to fit in with the vagaries of the weather. In furtherance of this plan he has recently purchased a McConnel beet harvester. He is now considering the introduction of sowing and thinning machinery to speed up spring and early summer work.

MECHANICAL HARVESTING

A Season's Experience

—T. H. TIMMIS—

author of this article farms at Hartlebury, Worcs. He has grown successful crops of beet for the Kidderminster factory over a long period. Looking back, now that the 1946-47 season is over, he says we can arrive at some valuable conclusions concerning mechanical harvesting. Here are his experiences — concluded with a few suggestions for future modifications.

I STARTED the season the proud possessor of one of the limited number of new sugar beet harvesters, and I had high hopes of an easy and quick harvest. But chiefly due to excessive rainfall the season turned out to be a chapter of disappointments, starting with late delivery of the machine, which was disastrous, because it meant we completely missed the free loading period at the beginning of the season.

The weather over this period, the last week in September and the first fortnight in October, would have been most favourable for operating the machine, a McConnel-Silk.

The weather was, of course, our greatest disappointment. The land became so wet that we could not operate the machine at all for the latter half of the season, and only ten of our 30 acres was in fact lifted mechanically. Hoping for an improvement in the weather we delayed hand lifting, and this in turn made it a costly and dirty job, completed eventually, however, with the aid of 22 prisoners.

Now, to brighten the so far gloomy picture, I must say that the lifting of the ten acres by machine *was* both easy and quick.

We had estimated that in an ordinary working day we could lift about two acres, but, having plenty of other jobs on at the time, we decided to work with a small gang and aim at lifting and delivering one acre a day. To accomplish this we worked the machine until we had filled the motor lorry. Then we stopped so that the harvester driver could take the lorry to the factory. I should explain that the lorry was left standing on the headland, with a man for loading, and each time the harvester came round we tipped the trailer alongside.

Our estimate proved correct, and we did actually lift and deliver an acre of beets each working day.

But looking back, we now realise that as the weather was favourable it was a mistake not to keep the harvester working all the time, heaping the beets for delivery to the factory later.

Our gang consisted of two men topping with Dutch hoes, getting a little ahead when the machine was not working ; one driver, for both tractor and lorry ; one boy, picking up odd beets ; and one man throwing beets into the lorry. We had intended to increase the lifting rate to two acres a day when sufficient labour became available. This would have needed two more men topping and possibly another man loading or throwing up into a heap when tipped from trailer.

From these actual facts any grower can work out the cost per acre based on the wages he pays. A point to be borne in mind is that two jobs have been eliminated—carting off and top spreading.

Regarding the machine itself, I have found that successful operation comes with practice. Stoppages

which took time to clear at the beginning were quickly dealt with after a few days experience. It was the same with adjustments, with which this machine is admirably fitted. Most of our stoppages were caused by beets being stabbed by the fingers of the vertical elevator, which tried to carry them round again instead of releasing at the top. A slight alteration in design would no doubt overcome this.

Among the improvements which suggest themselves to me are :—

(a) The provision of a simple safety clutch, to prevent engine stalling ; (b) A lever lift for the front end of the conveyor chain, with multi-positions to suit varying conditions ; (c) A more powerful engine ; (d) Better stone guards to all chains ; (e) A little less weight on the drawbar, as it tends to lift the tractor front wheels.

Also, I am not convinced that an absolutely vertical elevator is the best. An inclined one would facilitate passage of beets from conveyor to elevator, as they would then be dropped on to it instead of being picked up at right angles as now.

The makers have undertaken to fit gratis to my machine any improvements they may make next season, and with the better weather we hope for I feel sure we shall be a long way towards solving our labour problems.

NEW ELEVATOR FOR BEET LOADING

ANOTHER new elevator incorporating several commendable features is shortly to be placed on the market. As shown in the accompanying illustration, it has an overall length of 17ft. 4 in., of which the upper half (8 ft. 8 in.) is adjustable by windlass to the horizontal position. This is particularly useful when loading bags or for loading beets over a hedge to a waiting lorry.

Soundly constructed of channel steel, the elevator is none the less easily manoeuvred. It is powered by a 1½ h.p. Petter engine equipped with a governor. Primary drive is by belt, thence by chain and sprocket to the top of the elevator—unlike some machines where the drive is to a sprocket at the lowermost point. This should ensure a longer working life of at least some of the moving parts.

The tines on the conveyor bars are very quickly detachable by the removal of one wing nut to each bar. At the bottom of the elevator is an effective agitator, which, without damage to beets, removes a considerable amount of soil. The hopper also is quickly detachable, and only requires lifting off.

The machine, the "Conveyall No. 2," is made by Salopian Engineers, Ltd. In recent tests, forking beets from a flat platform, it handled 3½ tons in ten minutes.

EXPERIMENTAL WORK
AT ROTHAMSTED STATION
Report on Sugar Beet Manurial Trials

MUCH of the laboratory work at Rothamsted Experimental Station had to be allowed to fall into arrears during the war, in order that problems immediately connected with increased food production might be undertaken, but the field work of the classical and the more important of the other experiments, including the sugar beet manurial trials, was continued.

These facts are recorded by Dr. W. G. Ogg, M.A., the director, in the Station's first report since 1938. (Price 5s. 0d. from the Station.)

Dr. Ogg points out that much of the soil work consisted of short-term investigations which could be regarded as "operational research" in the food-production campaign. These investigations, however, had more than a short-term value for they supplied much information which will be of value in long-range soil-fertility investigations. Amongst the problems set by the war were: How to maintain or increase production and at the same time practise a rigid economy in the use of fertilisers, and how to handle to the best advantage the large area of old pasture land which had to be broken up.

The following review is chiefly concerned with experiments relating to sugar beet, but this is by no means the only subject covered by the Report, which describes at length the work of each department.

For information on matters not included in this necessarily brief survey readers are referred to the full document.

Among the matters of sugar beet interest dealt with are: The well-known fertiliser trials; plant viruses and virus yellows; segmented seed; and the only experiments so far carried out in this country on the manuring of sugar beet seed crops.

The work on sugar beet manuring is reported on by Dr. E. M. Crowther, Department of Chemistry, who states that the standard series of experiments carried out since 1934 has served to establish the general requirements of this crop for average soils and seasons, and to show how special soil needs can be estimated by soil analyses.

The average responses in 268 experiments on commercial farms, were :—

	Washed Roots tons per acre.	*Tops tons per acre.*	*Sugar per cent.*	*Sugar cwt. per acre*
0.8 cwt. N per acre as sulphate of ammonia	1.32	2.86	—0.40	3.8
1.0 cwt. P_2O_5 per acre as superphosphate	0.45	0.32	0.01	1.6
1.2 cwt. K_2O per acre as muriate of potash	0.44	0.26	0.22	2.0

The main need is for ample nitrogen with only moderate amounts of phosphate and potash. The responses to nitrogen and potash together were greater than the sum of the separate responses, but those to superphosphate did not depend on the presence or absence of other fertilisers.

	Cwt. sugar per acre
Response to 4cwt. sulphate of ammonia per acre ..	3.1
Response to 2cwt. muriate of potash per acre	1.2
Response to both together ..	5.8

The standard series of experiments brought out marked seasonal differences in the behaviour and composition of the sugar beet crop, points out Dr. Crowther. Thus,

the dry summer and wet autumn of 1944 were particularly unfavourable for sulphate of ammonia, whereas in the wet summers and dry autumns of 1936 and 1941 sulphate of ammonia gave particularly large average responses.

From 1940 onwards the design was modified to test in addition the effect of 5 cwt. agricultural salt per acre. The average results for the individual years and for the main classes of soils are summarised below for plots receiving nitrogen at the rate of 4 cwt. of sulphate of ammonia per acre. On the average of over 100 experiments 5 cwt. of salt gave 5.2 cwt. of additional sugar, whereas 2 cwt. of muriate of potash gave only 2.8 cwt. of additional sugar. Even where 2 cwt. of muriate of potash was given there was a further response of 2.6 cwt. of sugar for 5 cwt. of salt, but where salt was given there was a negligible additional response to potash.

Dr. Crowther advises sugar beet growers to use salt much more generally, even when supplies of potash are easier to obtain.

Special series of experiments have shown that the salt may be applied at any convenient time up to a week or two before sowing, even before the winter ploughing. Although the soil structure may be temporarily damaged by heavy rain after applying salt, there has been no evidence of any bad effect on the crop or any cumulative effect on the soil, even where, as in one Rothamsted experiment, salt is applied every year.

The report includes some notes on the Rothamsted Farm six-course rotation experiment on seasonal variation in responses to fertiliser. This experiment and an experiment of the same design at Woburn were begun in 1930. They give information on the relative responses to fertilisers of the six crops of the rotation (barley, clover, wheat, potatoes, rye and sugar beet), on the

Cwt. additional sugar per acre on sugar beet plots receiving Sulphate of Ammonia

Average of all soils (ex. fens)	*No. of trials*	*From muriate of potash*	*From Salt*	*From muriate of potash and salt together*
1940	24	3.5	5.4	6.1
1941	22	3.2	4.8	5.2
1942	21	3.4	5.0	5.8
1943	18	1.1	4.4	4.4
1944	18	2.4	6.4	5.2
Five years	103	2.8	5.2	5.4
Average for five years :				
Coarse sands	20	2.8	5.4	6.4
Fine sands	19	4.7	5.7	6.5
Light loams	37	2.3	4.7	4.4
Heavy soils	27	2.2	5.3	5.2
Fen soils	9	2.4	2.3	3.8

Systematic analyses of samples of sugar beet tops and root showed that the larger crops grown with salt contained no more potash than those without salt. Considerable amounts of sodium are taken up from the salt, but only a very small amount of the sodium reaches the roots. This work has shown that sodium must be regarded as a true plant food for sugar beet (and mangolds), and that salt does not act by drawing on reserves of potash in the soil.

variation in response from year to year, and on the relation between response and rate of application.

The design is such that the effects of individual treatments are not cumulative, and it will therefore be possible to evaluate the effect of seasonal weather conditions on yield and fertiliser responses when a sufficient number of years has elapsed.

A noteworthy feature of both the Rothamsted and the Woburn experi-

ments is that although no farmyard manure is given at any stage of the rotation, there is no evidence of a downward trend in yield of any of the crops during the course of the experiment.

In 1944 observation plots were laid out to compare segmented sugar beet seed drilled at 10lb. per acre with normal seed at 20lb. per acre. The plants from the normal seed were much thicker in the row before thinning and averaged 58 plants per 100in. length, compared with 31 plants from the segmented seed. Using normal seed, out of 100 separate inch lengths 32 contained plants, of which 50 per cent. were single plants, while from segmented seed only 22 of the 100 separate inch lengths contained plants, but of these 73 per cent. were single plants. Singling of the plants from segmented seed was noticeably more easy and rapid, and the plant was less damaged, but the final count per acre showed a difference of 4,000 plants per acre in favour of the normal seed.

In 1945, normal seed sown at 16lb. per acre was compared with segmented seed sown at 4, 7 and 10lb. per acre. Seed-bed conditions were not particularly good and a spell of very unfavourable weather immediately followed the drilling. The segmented seed germinated much more slowly and unevenly than the normal seed, and when the plots of normal seed were ready for the first horse hoeing those of the segmented seed had to be missed as the rows were not showing sufficiently clearly.

These plots remained backward throughout the season, and the plant number and yield was increased with the rate of drilling. Normal seed gave 5,000 plants per acre more than segmented seed sown at the heaviest rate.

This result confirms experience gained elsewhere that segmented seed is not likely to be successful where conditions at sowing time are unfavourable. It also appears that for the lower seed rates to be successful the seed must be placed far more accurately in the row.

The report includes a comprehensive classified list of the publications of the Station and its staff. As with previous reports, the present does not include the detailed results of experiments; these are, however, available from the Secretary.

R.A.F. Landing Tracks Find Peace-time Use

RUNWAY tracks as used on the beaches and for temporary landing strips during the war are now being utilised by farmers in gateways and other places where mud makes the going difficult.

The tracks, which are in the form of mats ten feet wide by 25 yards long, are very effective. Where the land is particularly soft it may be necessary to use two mats, one on top of the other. It is essential to stake them well down.

Roadside piles, regarding which the highway authorities are now adopting a stricter attitude, can frequently be eliminated by laying the track in gateways, thereby making it possible to load lorries direct from clamps built just inside the field.

"Would-be purchasers are advised to contact the headquarters of the Air Ministry Works Directorate in the particular locality concerned," the Air Ministry inform the BRITISH SUGAR BEET REVIEW.

They add that large quantities have already been sold and in certain areas only a limited amount remains for disposal.

The prices fixed for current sales are :—

Used tracking without pickets, etc.	12s. 6d. per roll of 25 yds.
Unused tracking without pickets, etc.	37s. 6d. per roll of 25 yds.
15ft. linking bars	1s. 6d. each.
3ft. pickets	6d. each.
2ft. pickets	4d. each.

MECHANISATION TO-DAY

A Survey by O. S. ROSE

I AM writing in a Continental hotel during the first week of February—recovering from an attack of influenza and listening to forecasts of still rougher seas with a continuation of easterly winds from Siberia; it is indeed a fitting atmosphere in which to contemplate the final scenes in the British beet fields!

Carting and, in some cases, lifting beet in January and February is an unenviable task, but the very fact that it had to be faced in so many instances provides an added incentive to all who are striving towards mechanisation. The present therefore seems an appropriate time to ponder on this aspect of development and to assess progress to date. Progress is not an easy word to define, and is consequently often misused. In any form of agricultural mechanisation real progress can probably be considered as first established at the stage when farmers have sufficient confidence to put new machines (and often this implies new ideas also) into practical application.

The following record, which relates to the 1946-7 season, will serve as a convenient basis from which future progress may be judged.

MECHANISATION—Season 1946-7.

	Acres.	*Percentage of total British Crop Acreage.*
Approx. acreage cross-blocked	1,600	0.39
Approx. acreage hoed by row-crop tool bars attached to tractors.....	75,750	18.25
Approx. acreage harvested mechanically	4,050	0.98
	No.	
Roadside elevators in use	539	
Elevators available for loading at railway stations	15	

Without doubt, mechanisation of inter-row cultivations is making real headway, and it is estimated that last year about 3,000 tractors complete with tool bar attachments carried out all the hoeing operations on more than 18 per cent. of the entire crop acreage. Scottish growers easily lead, with nearly half their total acreage hoed mechanically, followed closely by growers for the three Norfolk factories and Bury St. Edmunds.

Several cases have been reported in which tractors fitted with underslung attachments have hoed 20 acres per day and more; and although these may be exceptional there seems every justification for stating that the method is extremely economical in labour and cost. However, it must be remembered that loss of plant is likely to be pronounced unless the operator is very efficient, and is working on a crop that has been drilled dead straight.

For a number of years, and in many parts of the country, labour-saving by cross-blocking has been tried but has not so far been widely adopted. Most headway appears to have been made in the King's Lynn neighbourhood, where about 2½ per cent. of the beet crop was dealt with in this manner last season.

Segmented seed, which has now undergone two years of numerous tests, was sown by several hundred farmers on small areas of their commercial crops last year. Its use has been handicapped by the absence of suitable drills, and although, generally speaking, it has fulfilled experimentally the hand labour saving claimed for it, it has not emerged from its first year of practical application with very good prospects of widespread future adoption. Considering the optimism that

prevailed when it was introduced, this is most disappointing.

The difficulty of seeing the rows early enough to enable the inter-row cultivation to take place, combined with the poor initial stand obtained where pests have been at all prevalent, has dampened farmers' enthusiasm to such an extent that present indications are that the total quantity sown in 1947 (less than 6,000 acres of the 400,000 to be grown) will not exceed one per cent. of the total seed requirements. Its potential value is, in any case, still obscured by the lack of suitable drills with which to sow it.

In short, it has to be admitted that the major spring problem of reducing the hand labour requirements for chopping out and singling remains unsolved, and that so far there is no immediate prospect of its solution.

Contrary to the position in America, the harvest is in more urgent need of mechanisation than the spring work, and here prospects are definitely brighter. Indeed, the manner in which many farmer-pioneers have contrived during one of the most unfavourable autumns on record to keep operating such a high proportion of the 100-odd machines now in Britain, is a matter of the highest importance to the future or perhaps even the survival of the industry.

The most gratifying feature of last year is that farmers succeeded under the worst possible weather conditions in many different parts of the country and on a very wide range of different texture soils. Two of the brightest spots were Allscott in the West and Cupar in Scotland, where approximately 1.3 per cent. and 1.2 per cent. respectively was lifted mechanically. The late or non-delivery of machines spoiled some factories' figures, amongst them Peterborough, where 36 machines averaged 36.7 acres per machine and lifted 4.5 per cent. of the entire acreage.

Cost of operation varied considerably, but can generally be regarded as less than half the normal cost incurred on hand work, which, of course, necessitates the use of a lifter. In regard to depreciation it is important to note that machines first used six years ago look good for several seasons' work yet, which rather suggests that providing maintenance is kept at a high level depreciation may be based on at least a ten-year life. This makes sugar beet harvesters a practical proposition for thousands of growers.

The future trend envisaged is that the owners of machines will be divided into three groups :—

(a) Farmer-owners using the machine entirely on their own land ;
(b) Two or more farmers sharing, or one owning and doing the work for his neighbours ; and
(c) Contractors.

With regard to the latter, it does not seem beyond the bounds of possibility that in this coming age of mechanisation there may be a wide development in the field of specialised agricultural contractors, which would ensure maximum employment of the experienced personnel who would necessarily have to be in charge of the machines if they are to work successfully and economically. One does not need much imagination to foresee the possibilities of all-the-year-round contracting, starting with deep ploughing and including drilling, row-crop hoeing, corn combining, and mechanised sugar beet and potato harvesting. The personnel employed could not only undertake repairs during the periods between operations, but could also apply their specialised knowledge to the maintenance of similar machines belonging to farmers.

Considering that the average time taken by hand labour to harvest sugar beet, including ploughing out, is approximately 50 hours per acre, harvesters capable of averaging 1½ acres per day effect a saving of five man-days per acre. Applied to one-third of the British acreage this is equivalent to approximately 670,000 man-days. Expressed another way,

the mechanisation of one-third of the crop would release about 14,000 men for two months to assist with the other two-thirds of the crop. Actually, it has already been observed that the release of labour that occurs where a few machines are being operated greatly benefits neighbouring farms, and prevents piecework rates from getting out of hand.

Farmers embarking on mechanisation for the first time during the coming season will find that to take advantage of the better weather of early autumn it is desirable, if at all possible, to sow early and thus ensure a high degree of ripeness; furthermore, it is essential that the setting of the drill coulters is very accurate and the headlands wide. Although there is still a pressing need for the large-scale production of machines which leave the crowns and tops in a suitable condition for feeding to livestock, results obtained by the majority of farmers during the past season are so encouraging that we can face next autumn full of hope, confidence, and optimism.

HARVESTERS' RECORD LAST YEAR

AFTER attending the demonstration of harvesting machinery at Barningham Hall, Bury St. Edmunds, last October, many farmers are asking for information regarding the results attained by the machines in normal use. Great interest will therefore be taken in the list below. The widely varied location of the machines is worthy of particular note.

Name and Address	*Machine*	*Acreage*
Thompson, H., Littleport, Cambs.	John Deere 175; Catchpole 75.	250
Jones G. W., Ramsey, Hunts.	Catchpole (2)	150
Berry, R. J., Toneham, Thorney.	Catchpole	110
Brand, E. P., Station Road, Warboys, Beds.	Catchpole (2)	100
Tinsley, H. C. C., and Son, Peterborough.	John Deere (2).	100
Burgess, H. S., Whittlesey.	Catchpole	95
Howes, A. R. and Sons, Bury St. Edmunds.	Catchpole	95
Whiting, S., Bury St. Edmunds.	Catchpole	82
Tilbrook, R. F., Bury St. Edmunds.	Catchpole	69
de Ramsey, Lord, Estate Office, Ramsey.	Catchpole	66
Whattoff, J., and Son, Baston Fen.	Catchpole	65
Carter, R., Aylsham.	John Deere	60
Perkins and Whittome, Ramsey.	Catchpole	58
Wade, J. W., Ramsey St. Mary.	Catchpole	52
Ashton, J., Bourne.	Catchpole	50
Chapman, G. T., Woodbridge.	Catchpole	50
Jackson, Bros., Thirsk, Yorks.	Catchpole	50
Martin, H. J. and H. G., Littleport.	John Deere	50
Robinson, J., Peterborough.	Catchpole	50
Thory, G. M., The Almonds, Warboys.	Catchpole	50
Wilkerson, J. C., Royston, Herts.	Catchpole	50
Corney, Bros., Ramsey St. Mary.	Catchpole	49
Bayles, W., Holton-le-Moor, Lincoln.	Catchpole	46
Bell, R. S., Thirsk. Bell, Mrs. E. M., Thirsk, Yorks.	Catchpole	45
Goodall and Setterington, Langworth.	Walmsley-Goodall	45
Home, J. W. and Son, Berwick, Shrewsbury.	Catchpole	45
Catchpole, Mrs. A. J., Bury St. Edmunds.	Catchpole	43
Taylor, G. C., Inchture, Perthshire.	Catchpole	43
Whittome, J., Ramsey.	Catchpole	43
Batt, Major W. F., East Beckham.	Catchpole	42
Coleman, R. H., near Scunthorpe.	John Deere	41
Evans, F., Isombridge, Wellington, Salop.	Catchpole	40
Saul, T. A., Skegness.	John Deere	40
Worth, A. H., Fleet, Spalding.	John Deere	40
Major, J. B., Ramsey.	Catchpole	38
Clarke, T. W. H., and Son, Ltd., Ely.	Catchpole	35
Gray, J. and Co., Wellingborough.	Catchpole	34
Mossman and Stratton, Ramsey St. Mary.	Catchpole	33
Tarry, V., The Lodge, Pytchley.	Catchpole	33
Robinson, T. H., Lewes.	Catchpole	32

Cross-Blocking in Norfolk

25% LABOUR SAVED

FOLLOWING two successful cross-blocking demonstrations last year, Wissington, Norfolk, beet sugar factory now announce their intention to stage another three next May. They will be on the farms of Messrs. J. R. and R. R. Bennett, at Downham West; the Meadow Farming Company, Methwold; and in the Swaffham district, on a site not yet definitely fixed.

Mr. S. Culpin, Assistant Director of the Norfolk Agricultural Station, has promised to co-operate by demonstrating some of the precision drills to be used at Sprowston thisseas on.

Pointing out that experienced Norfolk growers report a saving with cross-blocking of up to 25 per cent. compared with normal hand singling, Mr. H. J. Meadows, agriculturist at the Wissington factory, says "All beet growers should carefully consider cross-blocking as a means of saving labour in singling the crop."

Synthetic Sugar Discovery

FOR original studies which may enable scientists to learn more about the manner in which sugar is utilized in the human body three University of California research workers have received the first intermediate $5,000 prize award from the National Science Fund of the National Academy of Science. Winners of the prize, established in 1945 by the Sugar Research Foundation, are Drs. W. A. Hassid, W. Doudoroff and H. A. Barker.

Their discovery of a method by which crystalline sugar can be synthesized enzymatically is significant, comments the American journal *Sugar*, reporting the awards, not because of its commercial possibilities for increasing scant sugar supplies, for it has none, but because of its scientific implications. Its disclosures of a method for sugar synthesis through the action of living organisms, and also the details of the reversal of this action, are both important.

IN BRIEF

Averaged throughout last season, every two roots delivered to the **Felstead** factory contained more than a week's sugar ration for one person.

Mr. James Turner has been re-elected President of the National Farmers' Union, with Mr. J. N. McClean as Deputy-President.

Sugar Controller **Sir William Rook** has been visiting the United States on behalf of the Ministry of Food.

Mr. S. J. Wright, Director of the National Institute of Agricultural Engineering, Askham Bryan, has resigned to take up a commercial appointment.

Available strains of **sugar beet seed** recommended by the National Institute of Agricultural Botany are briefly described in Farmers' Leaflet No. 5, obtainable from the Institute at Cambridge.

For the eighth successive year, **Tate and Lyle, Ltd.,** the sugar refiners, have paid a total dividend of 13½ per cent. Net profit for last year was £783,097, of which £250,000 was placed to general reserve.

Visitors to Selby

AMONG recent visitors to the Selby beet sugar factory were the Chief Constable of Wakefield City Police Force (Mr. A. E. Godden), Mr. A. Marshall, Managing Director of W. R. Wilkinson and Co., Ltd., the Pontefract liquorice firm, Mr. H. Paffley, Managing Director of W. and J. Simpson, the Wakefield biscuit manufacturers, and Mr. J. Quinn, the Cementation Co., Ltd.

MANGOLD FLY

Cont. from page 93

attempt to control the flies before oviposition.

There has been considerable work on the Continent against this pest, using a bait spray of sodium fluoride and sugar solution. This was tried and later used in a modified form during 1943-4 with very satisfactory results.

Preliminary spraying indicated that the sugar solution dried too quickly thus limiting its period of efficiency. In all subsequent sprayings beet molasses was used as the sweetener and attractant. Whereas the sugar solution dried out within half an hour, the molasses spray was still present and effective three days after application. The constituents were 4lb. sodium fluoride and 9lb. molasses in 100lb. (10gal.) of water, and application was at the rate of 25 gal. per acre. It was found necessary to mix the molasses with warm water before dissolving the poison, otherwise difficulty was encountered in obtaining a uniform mixture.

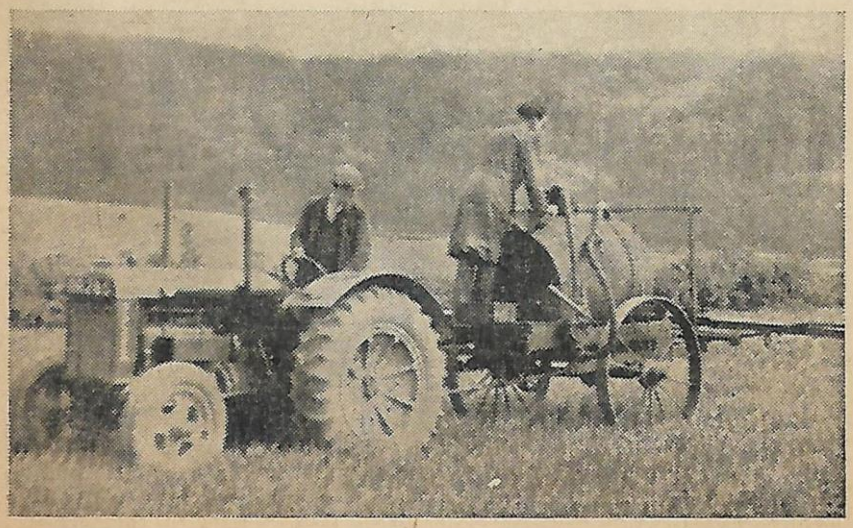
Sodium fluoride, being poisonous to animals, should be used with care.

Almost any sprayer can be readily adapted to deliver the low rate required, 25gal. per acre, the method used during the experimental work being to block alternate nozzles of the spray bar with cotton wool. An ordinary barrel-type charlock sprayer was used with quite satisfactory results. Unfortunately, commercial sodium fluoride often contains a gritty insoluble impurity that may block the nozzles unless careful watch is kept and the operative nozzles cleaned out regularly.

It must be borne in mind that the emergence of flies in the spring takes place in the sugar beet field of the previous year, so spraying must be carried out on that field. During 1943-4 wheat followed sugar beet in every case, and this crop was sprayed with no adverse effect. Actually it appeared to be rather beneficial, as the sprayed wheat developed a darker green colour and wider blade as though it had received a heavier manurial dressing.

As the flies have to pass out of this field in order to find sugar beet or mangolds for egg-laying, it is not necessary to spray the whole of the field. Two "breeds" around the headland make a poisoned belt over or through which the flies must pass if they are to complete their life-history. Spraying against the first generation was

Sprayer used in the experiment



carried out on May 3rd and May 6th in 1943, and on May 18th and May 22nd, in 1944. For days after each application large numbers of dead flies were found in and around the poisoned area.

Spraying should be done every fourth and fifth day whilst the flies are on the wing (usually about a fortnight) or oftener during adverse weather, as the solution is washed off by heavy rain.

Mr. A. Roebuck

This procedure can be carried out during June-July against the second generation, but now it is necessary to spray on the field of sugar beet, as the flies which have avoided the poison will have passed through their life cycle and fresh flies will be emerging from the soil around the sugar beet plants. It is necessary to spray the whole of the crop. During 1943 the spray was applied on June 29th and July 6th to the sugar beet, no harmful effects being observed, whilst in the following year it was found to be quite unnecessary.

The mangold fly has several wasp-like parasites which flight later than their host in May, and lay their eggs on the larvae actively feeding inside the sugar beet leaf. If the spraying against the first generation is timed accurately, the poison bait has disappeared when these helpful insects are about. During later generations there is considerable overlapping, but observation has shown that the parasites are not attracted to and do not appear to take the bait.

Reducing the numbers of the pest by poison bait spraying upsets the balance between host and parasite, with the result that the relative number of mangold flies decrease while its parasites increase. In the experimental work referred to, pupae were collected from each generation in order to observe the numbers parasitised, and the following table gives the figures for the generation under observation.

Generation	*% Parasites emerging*
1st Generation 1943 ..	5
2nd Generation 1943 ..	20
3rd Generation 1943 ..	80
1st Generation 1944 ..	95-100
2nd Generation 1944 ..	—

During the second generation in 1944, parasitisation was so complete that no pupae could be collected for further observation—in other words the attack had been defeated. In the following year 1945, no attack developed at all on the farm where spraying had been used, but this was a very local happening as attacks were as widespread and severe as ever outside that limited area.

Further work is in progress to ascertain whether the new insecticides D.D.T. and benzene hexachloride can successfully replace the sodium fluoride and molasses bait spray. Doubtless, these substances will kill the mangold fly, but here, their prolonged activity may possibly be detrimental, as the effects may persist and kill the parasites, which do not succumb to the sodium fluoride poison spray.

As there is considerable variation in the times of emergence and egg-laying from the Northern to the Southern Counties, and from year to year dependent on climatic factors, in those areas where spraying is contemplated it is advisable to consult the Advisory Entomologist of the National Agricultural Advisory Service for the province concerned, for help in ascertaining the most suitable time to begin, as upon this factor depends to a large extent the success of the method.

SCOTTISH FARM

Cont. from page 95

The farm is well suited for rearing healthy stock, and apart from the permanent grass, of which 51 acres is reseeded lea, the cropping during the past season has been : Cereals, 80 acres ; temporary grass, 65 acres ; potatoes 38 acres ; turnips, 10 acres ; mangolds and sugar beet, 8 acres.

The soil is of an acid nature and needs constant liming. Turnips suffer from finger and toe disease, and the root break is receiving boron in its turn.

Mr. T. N. Mitchell

Mr. Mitchell, who served in the R.A.F. and was an instructor in Canada, was released in 1945, on the death of his father. Information with regard to cropping and stock was readily available and the efficient way in which Mr. Mitchell's books are kept and his correspondence typed is greatly to be admired. This, the writers found, is due to the fact that Mrs. Mitchell is sufficiently energetic to perform the work in addition to looking after the large house with little help.

Under Mr. Mitchell's management, a changeover in policy from feeding " bought-in " stores to rearing and feeding home-bred stock has been made, although still a few stores have to be purchased to make up.

For his foundation cows he has chosen the polled black Galloway and now has thirty-six of this hardy breed. When fully established he hopes to produce the well known blue-grey cross-bred by using a white Shorthorn bull. Most of the calves seen on the visit, however, had been sired by a red bull, as the first white Shorthorn bull bought by Mr. Mitchell became wild and had to be destroyed before reaching the farm. The 1947 crop of calves have been sired by " White Ensign," a pedigree white Shorthorn bull, bred at Clunie in Aberdeenshire. When seen, this bull was in store condition ; he is well coupled and deep set with an impressive forehand. His stock should do well.

The only hand feeding the Galloway cows receive is a little hay taken out to them for six weeks before calving. The calves are born on the hill and do not come indoors until the following winter.

In addition to the Galloway cows, the stock at Clentrie consists of 44 weaned calves, born April 1946, and 36 18-months-old stores, all of which were well-grown hairy sorts in good condition, particularly the calves. The rest of the stock consists of 106 ewes and 150 lambs, 10 pigs, and poultry.

It may be of interest to mention here that the bulk of the field work on this hilly, difficult-to-work farm is done by tractors, a wheel type and a track-layer sharing the burden. Manual labour is a difficulty and the force includes two women. The erection of four semi-detached bungalows is proceeding and it is hoped this will vastly improve the labour position.

Full use is made of the beet leaves and crowns and the mangold leaves. They are carted off and fed to the young stock on grass. The sheep are then put over the beet and mangold breaks to clean up any food which remains.

The 44 calves were kept on grassland with a daily feed of beet tops and mangold leaves for the three months, October, November and December. They made good growth, and when seen in late January were full of bloom and health ; until they were brought in they had lived entirely on the produce of the farm. From January onwards they received an ample supply of good ryegrass hay, whole green

turnips with a ration of 3lb. per head of the following :—National Compound Cake 4lb., Bruised Oats 4lb., Dried Beet Pulp 2lb., Oat Dust 2lb., and a mineral mixture made up on the farm. It will be seen that, except for half the concentrate ration, the whole of their food is produced on the farm.

The stronger stores housed in a neighbouring court were brought in at the beginning of November. Sugar beet pulp (wet and dried) forms the basis of their ration which consists of good oat straw, *ad lib.*, and 10 cwt. per day of ensiled wet beet pulp and 2lb. per head per day of dried beet pulp and oat dust in the proportion of three parts pulp to one part oat dust. This lot will be fattened off the grass next summer as two-year-old bullocks.

The ewes are kept on grass the whole year round and cross-bred lambs are brought in for scavenging on the stubbles and root land. The grassland is well managed and, being fairly heavily stocked, is well manured. It also receives in rotation lime, supers. or slag, and in some cases nitrogen.

So far, Mr. Mitchell has not had a high average yield of sugar beet. But he seems to be content if the cash return pays the cost of production, as he considers its chief value lies in the by-products and in the improvement of the soil. Much of the arable land is not very suitable for the crop although he could have cut his turnip acreage still further had not labour difficulties so far prevented him from increasing his beet acreage. As might be expected, he grows a large-topped variety and cultivates it with a view to a good yield of leaves and crowns.

Mr. Mitchell's system fits in well with the Government's desire for more home produced meat, and it will be interesting to watch his progress.

In the absence of imported feeding-stuffs during the war, the sugar beet crop has played a large part in the production of milk, and Mr. Mitchell has shown that it can play a vital part in producing high quality beef on farms not suited for dairying or intensive arable cultivation.

OFFICIAL FACTORY TESTS

COMPILED from data supplied by the British Sugar Corporation, the following averages relate to the beets delivered to the beet sugar factories in Great Britain up to 24th February, 1947. Figures for the earlier part of the 1946-47 campaign were printed in the December BRITISH SUGAR BEET REVIEW (Vol. 15 No. 2, p. 76).

	Average Weight of Roots (grammes)		*Average Sugar Content* (per cent)		*Average Sugar per Root* (grammes)	
	1946-47	1945-6	1946-7	1945-6	1946-7	1945-6
2 December	620	546	16.12	16.19	100	89
9 December	619	542	16.03	16.05	99	87
16 December	626	538	15.96	15.98	100	86
23 December	633	541	15.84	15.90	100	86
30 December	634	544	15.60	15.69	99	84
6 January	639	541	15.43	15.53	98	84
13 January	642	536	15.35	15.47	98	83
20 January	642	545	15.14	15.42	97	84
27 January	639	564	15.12	15.49	97	87
3 February	643	594	15.02	15.48	97	92
10 February	651	—	14.94	——	97	—
17 February	664	—	15.20	——	101	—
24 February	657	—	15.17	——	100	—
Average to date	617	535	15.95	16.17	98	87

The Cupar factory completed operations during the week ended 23 December, 1946.

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Bury St. Edmunds

Farmers' Transport

TRANSPORT Minister Alfred Barnes stated in the House of Commons on February 10 that goods vehicles used by a person engaged in agriculture solely for carrying the produce of, or articles required for the purpose of, the agricultural land which he occupied, did not require a carrier's licence and were, therefore, unaffected by the Transport Bill.

Gartons

We have discontinued our Strain B. (Type N.) Sugar Beet and are concentrating on our Strain C. (Type E.).

Our stocks for 1947 sowing will be well up to our usual standard; we do not make any extravagant claims for our Strain but we say that it is as good as any, perhaps a little better than some and certainly inferior to none.

We are afraid that growers cannot always obtain our Seed from the Factories owing to demand being always greater than available supplies.

Plant Breeders & Seed Experts

WARRINGTON

—SILK BEET HARVESTER—

The Birtley Company Limited have pleasure in announcing that they have acquired the sole manufacturing and selling rights of the Silk Beet Harvester.

Machines will be available for the 1947 Harvest.

Agents will be announced later, and in the meantime all enquiries should be addressed to The Birtley Company Limited, Birtley, County Durham.

COMING EVENTS

FOLLOWING is a list of agricultural shows scheduled to be held during the present year.

Show and Location.	*Dates*
Oxfordshire Ag. Soc., Banbury	13 May
Newark	14 May
Shropshire and West Midland	21–2 May
Colinsburgh, East Fife	22 May
Notts. Ag. Soc., Nottingham	25 May
East Halton	26 May*
Grantham	26 May*
Great Bath and West Cheltenham	28–31 May
Bradford and District Y.F.C., Ordsel Playing Fields, near Bradford	31 May
Messingham	2 June
Suffolk County, Euston Park, Nr. Thetford	5 June
Essex, Colchester	11–12 June
Three Counties, Hereford	17–19 June
Royal Norfolk, Keswick Park, Norwich	25–6 June
Winterton	27 June
Royal Agric. Soc., Lincoln	1–4 July
Hibaldstow	5 July
Kent County, Maidstone	9–10 July
Bedfordshire	10 July
Coupar Angus	12 July
Tendring Hundred	12 July
Haddenham Y.F.C.	12 July
West Sussex, Oaklands Park, Chichester	16–17 July
Peterborough	16–17 July
Gainsborough	19 July
Border Union, Kelso	3 August

* Whit-Monday.

The British Sugar Corporation's stand will be exhibited at the Royal Norfolk Show at Norwich on June 25 and June 26; and at the "Royal" Lincoln, from July 1 to July 4 inclusive.

GLOSSARY

Cotyledon :—The seed leaves—in the case of sugar beet the first pair to appear (p. 92).

Enzymatically :—By the action of ferments (p. 106).

Oviposition :—The laying or depositing of eggs (p. 107).

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Friendly relations . . .

make business a pleasure; and it is our good fortune to have friends in every branch of agriculture and horticulture — growers who are regularly consulting us on their pest and disease control problems. We invite every sugar beet grower to keep regularly in touch with our nearest P.P. Regional Office. Our experience and our resources in research and manufacture are always at your service.

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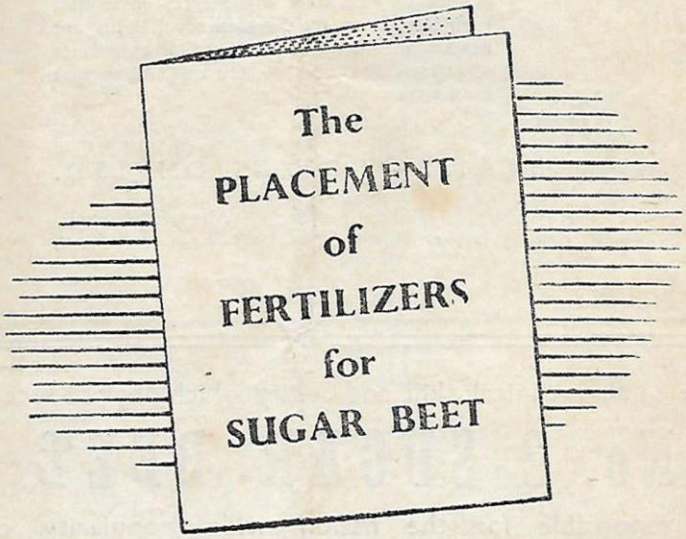

FISONS have now produced a "Progress Report" of experiments carried out in this country on the placement of fertilizers for Sugar Beet.

A great amount of research has yet to be done on this subject, but the pamphlet sets out some of the results that have been obtained to date from field experiments.

Copies of the pamphlet can be obtained post free on application to The Advisory Department, FISONS LIMITED, Harvest House, Ipswich.

It's Fisons for Fertilizers